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**(54) TIP, PIECE OF LASER SYSTEM FOR TREATING BIOLOGICAL TISSUE**

(57) Abstract:

FIELD: surgery; orthopedics; stomatology. SUBSTANCE: invention offers advantages due to fact that interior of tip piece of laser system for treating biological tissue contains acoustic detector which receives information of state of biological tissue to be treated. Information thus-received serves to optimize tissue treatment process conditions. EFFECT: minimum invasive action. 2 ci, 2 dwga

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1. **3asIBKa Hnonma** №1-16168, №1-161 **B** 17/36, №1986. **2. flarenT EBB** N 0073617, sn. №1-161 **B** 17/36, №1983.

(71) Applicant: Anwrmynep **рпуropzfl** Bopzcosu<sup>a</sup>

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**(73)Proprietor: AnbTHlynep I'pxrOpnfl BOpxcoBMLI**

(54) HAKOHE<sup>L</sup>THLIK JIA3EPHOYi CLICTEMb1 jji151 OBPABOTKI4  
BKOJIO'I<sup>9</sup>IECKO1 TKAHI4

**(57) Abstract:**

llpeRnaraeTcsl yCTpofCTBO, KOTOpOe MO?KeT 6bITb MCHOnb3OBaHO B xapypl'MH, opTo110AH11 M cTOMaTOnorMM. YCTpofCTBO o6ecnetmBaeT MHHBManbHylO BHBa3I BHOCTb M y JiO6CTBO npy npooejleHMM na3epbtx onepam . 3Tx npeaMymecTba RocT'Uralo'c5I 6narorapsi 3aipeInIeH1410 BHyTpb HaKOHe<sup>T</sup>muKa 11a3epHo2 CMCTeMbI o6pa6oTKN 6MOTKaBM aKyCCIMeCKOpo npBeMnMKa, KOTOpbIfI SIBnHeTc5I npMeMHMKOM MHdJopMaljHM o COCTORHMM 6MOnOpK<sup>9</sup>eCKOii TKAHM, Heo6xoJ;HMoi4 An,J;OCTM?KeHMR OITTMManbHOI'O peJKMMa o6pa6oTKM. 1 3.11. 4)-nbI, 2 Mn.

Description [Onrcarn a H3o6peTea<sup>5a</sup>]:

M306peTeHHe OTHOCHTCH K McJjH11 HCKOI TeXH'IKe H MOxte'r 6EITb HCIIOnb3OBaHO B xapypr. opTone;/HH H CTOMaTonopHH grin o6pa6crrxm MSIrKrIX H TBepJjbn TKaneii.

I43BeeTeH HaKOH<sup>4</sup>fiHK na3epHoro exanbneng, cojjeprcaulii CpeJCTBO JjocTaBxu na3epHoro H3nytleHHB go HOBepxHocTH o6pa6ammaeMoli 6HOTKarn [1] OCHOBBIM He.r OCTaTKOM JjaHHOro yCTpOICTBa \$IBn5leTC\$1 OTCTCTBHe B HCM HppHPaU,HOHHOro KaHana, a TaK}Ke epege 'rBa, no3BonBionLero OnpegenHTb BHJj o6pa6aTbIBaeMoi TKaHH.

<sup>1</sup>13BCCTeH Taxxe na3epHb11? HaKOH<sup>4</sup>HHK jjnB 6opManumm, KOTOpbIrl 5IBnHeTC51 HaH6onee 6f1113KHM 110 TCXHHUCCKO2 CyILHOCTH H npHICIT 3a npOTOTH [2] OTOT HaKOH<sup>4</sup>HK cor epHcHT, 'Tome epeJjeCTBa JjocTaBKH na3epHoro H3nyeHHB, Cpege'Bo JjocTaBKH go nosepxnocTH o6pa6aTbIBaeMoil 6HOTKaHH opoiaiouLeii xHgKoCTH.

OCHOBBIM HegOCTaTKOM npOTOTHna 5IBnHCTC51 OTCTCTBHe B HeM npaeMHHKa HH(4opMaLHH 0.cOCTOCHHHH o6pa6aTbIBaeMOLI TKaHH, HO3BOJIBIOHLeO onpejjenHTb ee BHJj.

3aJjaua, Ha peineHHe KOTOpoi Hanpaseno H3o6peTeHHe, 3axniO 'iaeTeH B cO3JLaHHH yCTpoiCTBa, o6ecne<sup>2</sup>aBaionLero yJjocTB0 npoBe)LeHH\$ na3epno\$ o6pa6oTKH 6HOTKann npa ojjHOBpeMCHHOM onreeneHHH BHJja m COCTOBHHI o6pa6aTbIBaeMo% 6HOTKaHH, tiro, B cBOIO Ouepejib, o6ecne'114BaT MHHManbHyIO HHBa3HBHOCTH.

3agaua peHiaeTen npH ocylgeCTBneHHH H3o6peTeHHB 3a cuer'rexHHUecxopo pe3ynTaTa, 3axnlo'iaioineroB B OTHMH3all,HH ycOBH2 npHeMa HH4opMaLHH o COCTOBHHH o6pa6aMIBaeMo2 TxaHH.

TexHHUecxafl pe3ynTaT JjocTHraeTCB 'rem, uTO BByTpH HaxoneHHKa na3epaoai CHCTeMbI p. n o6pa6oTKH 6Honoralecxog TxaHH, COJjepr}KauLeM CpeJCTBO JjocTaBKH na3epHoro H311yehHB no HOBepxHOCTH 6HOTKaHH, 3aKpenneH aKyCTH 'leCKHIp HpHeMHHK, BXOJJ KOTOpOPO COnpB}KCH c MeCTOM B03Jje\$CTBHB Ha 6HOTKaHb, TaKytO COOTHOnellHe pacCTopHHB OT OHTHyeCKOii OCH Ha BbIXOJje HaKOHuHHKa go BXOJLHO% HoBepxhocTH .aKyCTHyeCKOro npaeMHHKa H paCCTOHHI151 OT HOBCpXHOCTH HaKOHETHHKa B MCCTe ero OnTH'leCKOro BbIXOJja Jjo MecTa B03Jjei2CTBHB Ha 6HOTKaHb HaXOJ ITCSI B npegenax OT 1: 5 po 4:1. 9neKTpa4eCKH2 BbIXOJj aKyCTHyeCKOro npzeMHHKa cog :platen c 6nOKOM perHCTpaLHH HOCpej)CTBOM 3KpaHHpOBaHHO'IO Ka6eHb.

B iiaxoHeuHHKe MO}KCT COJjeprHcaTbCB cper c rao JjocTaBKH opoiaiou.ei2 x{HJjKOCTH JJO HOBepXHOCTH 6HOTKaHH.

M3BeCTHO, 'TO 944eKTHBHOCTb na3epHoi o6pa6oTKH 6HOnOraLeCKO2 TKaHH c OJJHOBpeMCHHbIM o6ecneueHHeM 11H3KO2 LIHBA3HBHOCTH (CTeHeHH HeKpO3a) 3aBHCHT OT JLTHHbI DOHHbI H MOHKOC'rH Ila3epHoro H3nyehH51, 3HeprHH H BpeMCHH na3epHoro B03JjeicTBaH H, JjJIB HeKOTOpIX BHJjOB TKaHH, BKHJKOCTHOro OpOHLeHHB 30HbI na3epHOP o6pa6oTxaH (CM. nanpaMep, Proceeding of Laser-Tissue Interaction V 24-27, January 1994, Los Angeles, California, Vol 2134A).

MCCnejjoBauHH, npoBeJjeHHbie aITOpOM, HOKa3aHH, <sup>1</sup>4to npH 9TOM Heo6xo) HMa ogHOBpeMeHHaB onTHMH3an asi yKa3aHHbIX napameTpoB Jjn, Ka}KJjOro BHJja 6HOTKaHH.

1411bMH CIOBaMH, He06XOJjaMbI: BO3MQ)KHOCTb Bb16opa OITHManblix JjnHH BOnH n3nyuennri na3epoB asia Hx cMeda, perCTpaYas1 Hpoiecca na3epaoii JjeeTpyKILHH, BHJja H CoCT05111151 6HOTKaHH H yHpaBneHHB J(nHOH BOnHbI, MOHBIOCTbIO, 3HeprHe2 H BpeMCHM na3epHoro B03JjeICTBHB, cacreMa opoineHHB 30HbI na3epHo2 o6pa6oTKH.

OnTHM113aJjH51 pe)icHMa o6pa6oTin Bo3MO2KHa npH HanH 'IHH CHCTeMbI 06paTHO2 CB513H, o6ecneunBalouejit ynnaeHHe napamepamH na3epHoro H3nyehHHB B 3aBHCHMOCTH OT COCTOBHHB H BHJja o6pa6aTbIBaeMoti TKaHH, T.e. Heo6xo) HM HpaemHHK IHH40pMaLHH o COCTO51HHI2 o6pa6aTbIBaeMo2 TKaHH, BbIXOJj KOTOpOro coeJjHHeH c 6nOKOM ynpaBneHHB napameTpaMH na3epHoro H3nyehHHB.

1pneMHHKOM HH4IOpMailHH 0 COCT0SIHHH o6pa6aTbIBaeMoil TKaHH MO)KCT 6bITb aKyCTH<sup>1</sup>leCKH7 npHCMHHK 3ByKOBOYi BOTLHbI, KOTOPa5I o6pa3yeTcI B pe3yhbTaTe na3epHopo pa3pymeHH5I 6HOTKaHH. )Ina pa3TH<sup>1</sup>mbIX TKaHeil aMI TIHTyjja aKyCTMICCKO\$ BOFhbI pa3natma (CM. Renso Salimbeni "Shock wave models keep laser surgeons on target" Opt Laser Europe June. 1994, p.p. 37-39).

11pH pa3pynlemw 6HoTKa m Mex,ny Ha<sup>1</sup>lanoM BO3AeICTBH5I na3epHopo HbnInbCa H noslwleHHeM aKycTHecKopo cHrxana Ha6nioAaeTCI apeMeHHan 3ajep)Kxa. BenHLnra wok' 3a,gep)KKH onpe)TCSI TpeM\$1 4 aKTopaMH: pacToaHneM OT He'rowmKa 3Byxa, KOTopbIM nnnsicTci o6pnyaeMasl noaepxxocTb 6HOTKaHH, AO npHeMHHKa, perCTpHpyionero axycTHleCKH\$ HMIIynb; HHTCHCHBHOCtbIO na3epHopo H3ny<sup>1</sup>ieHH5I Ha noBepxhocTH o6pa6aMIBaeMoII TKaHH H BenWIHOII nopora ee pa3pymeHH5I.

I4CCneAOBABH3I noxa3ann, HTO aKyCTH<sup>1</sup>leCKH4 HMnyhbC, B03HfKaOnI if npH pa3pynleHHH 6aoTKaHH c 6onee HH3KHM nOpOpOM na3epHopo pa3pymelum, HanpHMep AeHTHHa, HMeCT MeHbBlyIO BpeMeHHyIO 3a,BepIKKH oTHOCHTenbHO nauana na3epHopo HMnyhbca, ueM aKyCTHueCKH\$I. HMIIynbC, H03HHKaOnlaII npH pa3pymeHMI TKaHH C 6onee BbICOKHM nOpOpOM pa3pymeHHH, HanpHMep 3Manz (cM. G.B. Altshuler, A.V. Belikov, at all "Acoustic response of hard dental tissues to pulsed laser action". SPIE VOL 2080. Dental Applications of Lasers, 1993, p.p. 97-103).

TaKHM o6pa3oM, HAcHTH4HKamm BHAA o6pa6aTbIBaeMol TKaHH 3aBHCHT OT TO'HOCTH H3MepeHnn BpeMeHHOI 3ajep.iKKH.

3axenneHHe axycTHUecKopo npHeMHHKa BHyTpH HaKOHe<sup>1</sup>IHHKa ocBo6oxc,aeT OneyallnOHHoe none OT AOBOnHHTenbHbIX npHCH006neHHf, CBOANT K MHHHMMy /pnyKTya11H10 napaMe rpon npnHCITOpo alycTHUecKopo cHrHana H 3aBHCBMOCrb Beml'WHbI BpeMeHHO\$ 3ajepxcKH OT MaHHHn5ILW1I onepaTopa, a TaK)Ke 3an rnaeT aKycTnuecKHil npHeMHHK OT CarlaLIHbIX nOBpe)KAeHnYI.

fioMeujeHHe aKyCTy<sup>1</sup>leCKOpo npHeMHHKa c 9neKTpH4CKHM BbIXOAOM BHyTpH HaKOHe<sup>1</sup>IHHKa Bne<sup>1</sup>leT 3a co6oii HanB<sup>1</sup>fe B nocnejHeM HpOBOAHHKa c TOKOM. B 9TOM cnytae Heo6xo) nMo 06e30naenTb KaK na11HeHTa, TaK H onepaTopa OT Cny<sup>1</sup>ailHO B03MO2KHbIX 3eKTPOIHOBOBbIX n03AeICTBII4il. KpoMe Toro, Heo6xoPna noMexocTocT<sup>1</sup>wBaa nepejja<sup>1</sup>la BbIXOAHHX CHrHanOB K 6noKy HX perneTpailHH. fio9TOMy CoeAHHeHHe BbIXOAa aKyCTH<sup>1</sup>leCKOpo npHeMHHKa c 6nOKOM perCTpau,uu ni,inoIHeno nOCpeACTBOM 3KpaHHpOBAHHOpo Ka6ena.

no CBCACHHHM aBTOpa COBOKyHHOCTb H3IO'KCHHbIX B ipOpMyTie H306eTCHH31 11p3HaKOB snBcneTcI HOBOII, a caMO TexHwecKoe peiueHHe yAOBneTBOpHeT KpHTepHIO "Ii306peTaTenbCKH4 ypoBeHb".

Ha 4 nr. 1 CXMaTH<sup>1</sup>leCKII H3o6pa)KeH 6eKOHTaKTHbII HaKOHe<sup>1</sup>niHK na3epHOi CHCTeMbI jinsi 06pa6OTKH 6HOTKaHH; Ha 4Hr. 2 KOHTaKTHbII HaKOHe<sup>1</sup>IHHK.

BeCKOITaKTHbII HaKOHe<sup>1</sup>IHHK \*Hr. 1) COCTOHT H3 Kopnyca 1, BHyTpH KOTOPOpO paCHOTIO)KCHbI onrmleCKa5I CHCTeMa, COCTO5IH5I H3 OHTB<sup>1</sup>leCKOpo BOHKHa 2, KOHnyMIIpyIOIA02 nHH3bI 3, pOBOPOTHOpO 3epKana 4 H IOKycnyloIIeii nHH3bI 5, a TaKK)Ke BoAonponAHIAaal Tpy6Ka 6 H B03AyXOnpOBOAIIIIax Tpy6Ka 7. AKyCTH4eCKHII npHeMHHK 8 3aKpenneH BHyTpH HaKOHe<sup>1</sup>IHHKa TaKHM o6pa3oM, TTO epO aKyCTHueCKHII BXA o6paneH K MeCTy Bo3AeICTBH5I Ha 6HOTKaHb 9 (CTO<sup>1</sup>nmicy aKyCTH<sup>1</sup>leCKO2 BOHbI), a 9neKTpM<sup>1</sup>ieCKHII BbIXOA COeAHHeH c 6YOKOM perCTpa11HH 10 nocpeACTBOM 3KpaHHpOBAHHOpO Ka6e II 11. flepee BXAOM aKycTHUecxopo npHeMHHKa 8 Ha nonepXHOCTH HaKOHe<sup>1</sup>IHHKa paCHOnO)KeHa AHacppapMa 12. Pa6oTmil HHCTpyMeHT 13 (BOHKHO HnH ca I(DPobbbxYI CTepKem) KOHTaKTHOpO HaKOHe<sup>1</sup>IHHKa IIOKa3aH Ha 4 nr.2. 11pn pa6oTe c HHM MeCTO B03AeICTBn5I Ha 6uoTKaHb 9 yAaneHO OT nonepXhocTH HaKOHe<sup>1</sup>IHHKa 6o1lbHe, <sup>1</sup>ieM HpH pa6oTe c 6eKOHTaKTH,IM HaKOHe<sup>1</sup>IHHKOM.

MecTopaenonoxcenne aicyCTH<sup>1</sup>lecKOpO npHeMHHKa 8 onpe,eneHo H3 CneyIOII.IHX coo6paxceHHii.

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Y<sup>1</sup>HTbluan, uTO HaBMeHbinee paccTonnne OT IOBepXHOCTH HaxonegHHKa go MecTa B03J4CLICTBH5I Ha 6HOTKaHb 9 MO?KeT MCHSITbCH H jvui pa3nu'IHIX BHJTOB TKaHCH H o6pa6oTxx xone6neTen OT 8,5 go 20 MM, a JjIaMeTp (I)oKycxpyloueti nHH3bi 5 pasen 3 MM OT onT14<sup>1</sup>leCKO1i och 4oxycnpylonje i JHH3bi 5 no HallpaBnemno, nepneIJ;i'i'IKynslpxoMy 9TO11 ocx. MaxcHManbHO BO3MWKHoe yganenne aKycTHUecKoro npxeMHHxa 8 oT !Accra Bo3JjeLICTBHcT Ha 6140TKallb 9 orpa1HJnJBaeTCSI cHH?KeHHeM <sup>1</sup>ryBC'TBHTerlbHOCTH Coma perrCTpan1ouBoro axycTHUecxoro cxxnana H 9KpaHHpoBaHxeM BxoJja axycTHUecxoro npneMHHxa 8 pyxoft onepaTopa H cocTaBnxer 34 MM. Y<sup>1</sup>nITbBaH 4opMy HaKOHCH<sup>4</sup> HHKa, axycTHUecKH11 npHeMHHK 8 3axpennex nepeJj 6nx7?xai mek K mealy B03AC2CTBVIS1 Ha TKaHb BepMEHOLI yrna H3r16a Tena HaKOHcyHHKa TaK, <sup>1</sup>TO!COO'tHOMeHHe paCTOSIHNSI OT onTHUecKO1 Och go BXOJjHOLI noBepXHOCTH axycTHUecKoro npxemynKa 8 H pacCTosinxn OT IOBepXHOCTH HaKOH<sup>1</sup> HHKa B MCCTe ero OHTHUCCKOPO BbIXOga go MCCTa B03Jjei1CTBHR Ha 6HOTKamb, HaxogwrCSI B npegenax OT 1:5 go 4:1.

LICCne) OBAHHn, npo ejjeHtn'le aBTOpOM, noxa3ann, <sup>1</sup>TO npH pacnono?KeHBI axycrXJlecxoro npHeMHHKa B yxa3aHHbxx raper enax axycTnuecxasI Bonxa, o6pa3ylonkacH npH na3epHO\$ a6nsnjxx 6HOTKaneil, vxMeeT aMnnxTypy, rocTaTotn yto Rnx perxcTpanxz axycTHUecKHMH npxeMHHKaMH, KpOMe TOM, B 3THX npejjenax axmnwTyr a aKycTHUecKOI BOJHbi HeCeT HH4IOpMaI *wo*o Tnne o6pa6amxaeMoil TKaHH.

gna(pparMa 12 MO?KeT 6bITb BbIHOJHHeHa 143 McTaHn1UeCKOLi 4)OpMbl HnH nonHMepHOR HneHHK; *pOnb* KOTOpbIX 3aKrho<sup>1</sup>iaeTCSI B 3aI\$HTe BXOJjHO11 HOBepXHOCTH aKycTHUecKOpO npaeMHHKa 8 OT pa3neTaIOIB XCH uaCTH<sup>1</sup>lex 6HOTKaHH 9 H 6pbI3r BOJjbi, a TaxIKe cIBJIAeTCH pe3onaTopOM aKyCTHUCCKHX xone6auxi4.

Ilpxx npaxTHJlecxoft peanH3a1wH HaxoHennKa B KaueCTBe axycTHUecxoro npneMHHKa 8 BhI6paH MHKpO4OH I2HpMbi Bplonb H K'ber 4138 B KoMnnexce c npeJycanwTeneM 2633 H nepeXO) HHKOM UA 0160.

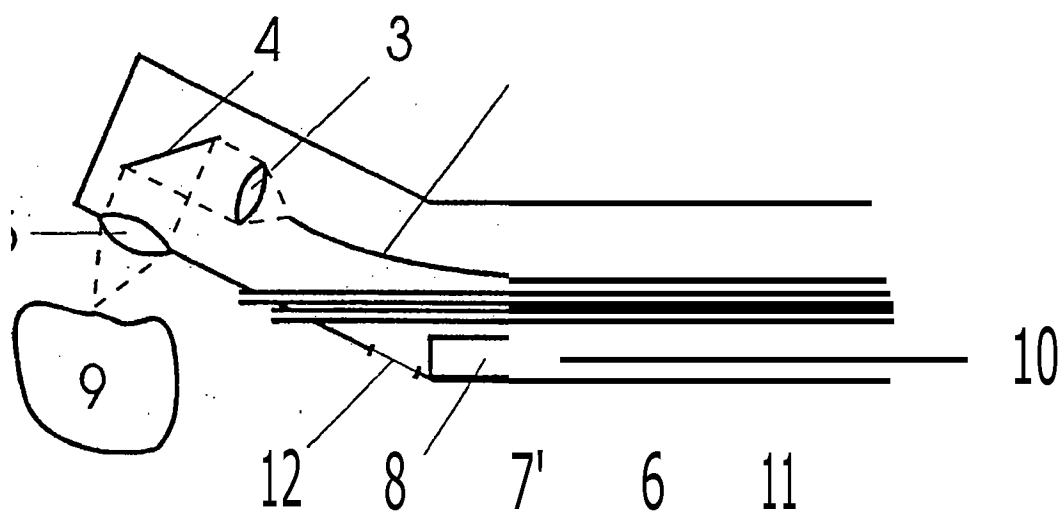
TaKHM o6pa3OM, npejnnaraeMoe ycTpOJICTBO HaKOH<sup>1</sup>HHKa 3a cueT COBOKynHOCTH 3a5IBnS1eMbxX npH3HaKOB o6ecneuHBaeT MHHHManbHyIO TpaBMaTH<sup>1</sup>HOCTb npH npoeJjennn na3epHoi o6pa6OTKH 6HOnOpHUCCKON TKaHH B COUeTaHHH c yjJO6CTBOM npoBepjeHHH o6pa6OTKH.

Claims [(Dopasyna H3o6peTeHHH):

1. HaXOHe<sup>L</sup>IHHK na3epnov"i cHCTelnl J;nh o6pa6oTKH 6HonorHHecHoti TKaHH, cogepaKantnia iCpCgCTBO JJOCTaBKH na3epHoro H3IIyMCHHH go noBepxHOCTH 6HOTKaiH, OTTH<sup>L</sup>talOnWRiiCSI 'rem, LITO BHyTpH Hero 3aipenneH axycTH<sup>L</sup>lecKHIZ npHezHHK, BXOJ; KOTOpOpO conpH, KeH c MCCTOM BO3,HCPCTBHH Ha 6HOTKamb TaK, <sup>L</sup>ITO COOTHOMeHHe pacce'rommH OT OHTHHeCKOI OCH Ha BbIXOJ;e HaKOHeliHHKa J;O BXOAHOH UOBCpXHOCTH axycTHLlecKOro npHeMIndia H paCCTOHHHH OT HOBCpXHOCTH HaKOHCHHHKa B MecTe ero onTH<sup>L</sup>lecKOro BbIxoga go mm-1'a .BO3J;c CTBHH Ha 6HOTKaMb HaXOgHTCH B npeganax 1 5 4 1, a 3neKTpH<sup>L</sup>lecKH7i BbIXOg cCOc 1fHCH c 6noKOM perCTpaHHH nocpegCTBOM 3KpaHHpOBaHHOtO Ka6enH.
2. Hasoxe'nlHK no n. 1, oTnH<sup>L</sup>axOIwiicH 'rem, <sup>L</sup>ITO coj;ep|KHT cpegCTBO J;ocTaBKH •opomaiozueft KHgKOCTH go noBepxHoCTH 6HOTKaHH.

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Drawing(s) [1epTemn]:



cVlr. 1

